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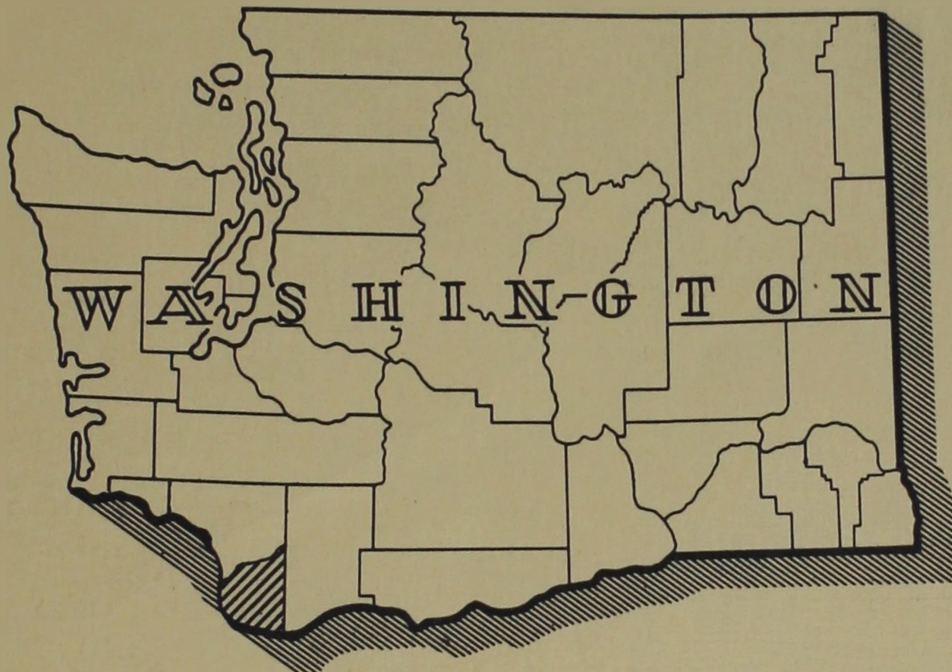
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FOREST STATISTICS FOR CLARK COUNTY, WASHINGTON

FOREST SURVEY REPORT NO. 108

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U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

≡

PORTLAND, OREGON



APRIL 1953

PREPARED BY THE DIVISION OF FOREST ECONOMICS

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FOREST STATISTICS

FOR

CLARK COUNTY, WASHINGTON

Forest Survey Report No. 108

by

F. L. Moravets

U. S. Department of Agriculture Forest Service
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director
April 1953

FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of Clark County, Washington, conducted in 1949. This reinventory is a part of the maintenance phase of the Forest Survey, a Nation-wide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available in reports survey information needed in the formulation of forest policies.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey Clark County was inventoried in 1931. Later the inventory was adjusted to September 1, 1933 and a statistical report, "Forest Statistics for Clark County, Washington" and a detailed forest type map--scale 1 inch to the mile--were released. In 1943 the first reinventory of the county was made and a revised statistical report and forest type map prepared.

Following the second reinventory, in 1949, the forest type map has again been revised. 1/

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland 5, Oregon.

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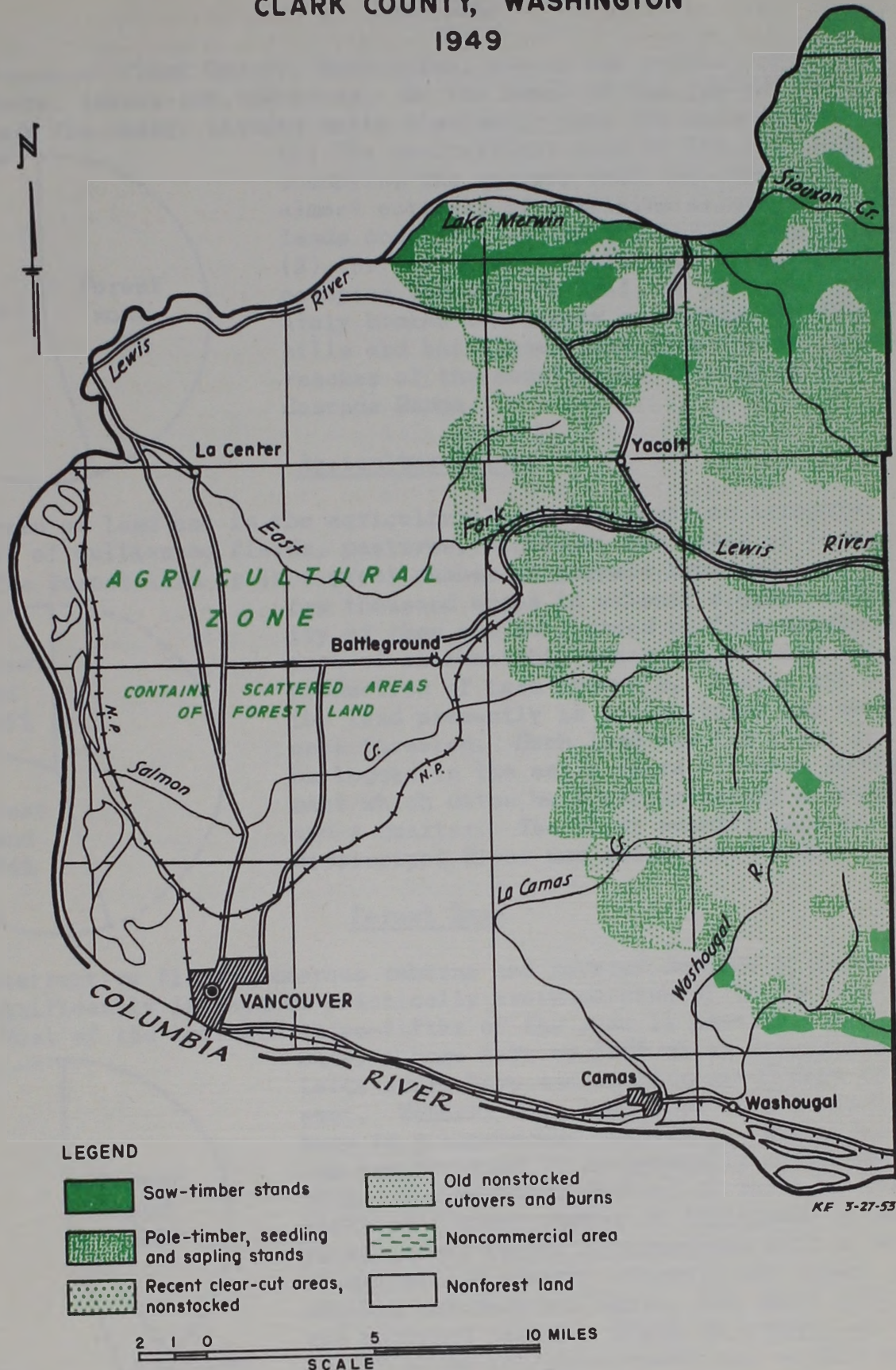
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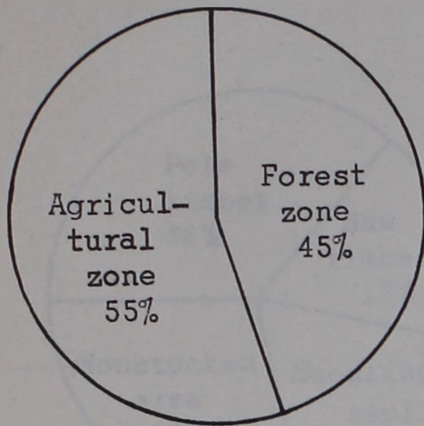
FIGURE 1
 FOREST STAND-SIZE AND CONDITION CLASSES
 CLARK COUNTY, WASHINGTON
 1949



SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

LAND USE

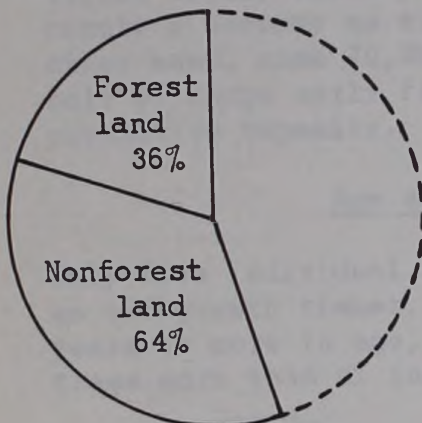
The land area of Clark County, Washington, one of the smaller counties in the State, totals 406,000 acres. On the basis of the general land-use pattern the county divides quite distinctly into two broad zones:



(1) The agricultural zone of 223,000 acres occupying the western half and consisting almost entirely of low-lying alluvial bottom lands and level to rolling terrace lands, and (2) the forest zone of 183,000 acres which occupies the eastern half, an area of moderately broken topography consisting of foothills and benchlands that form the western reaches of the mountainous terrain of the Cascade Range.

Agricultural Zone

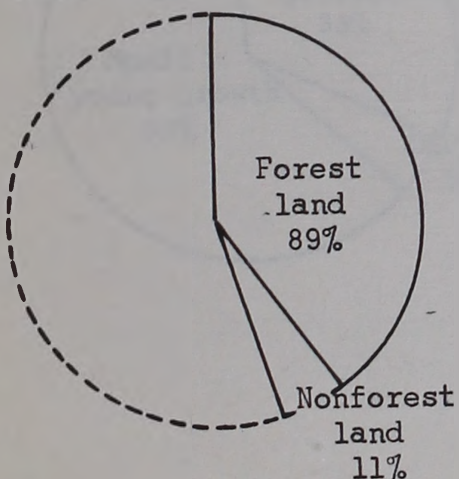
The pattern of land use in the agricultural zone presents an irregular patchwork of cultivated fields, pastures, orchards, and areas of forest land. The forest land is in a great number of parcels from one to a



few thousand acres in extent; a great majority of them can be classed as farm woodlots, part of an ownership managed primarily for production of farm products. Nearly all of the land presently in agricultural use was once forested. Such land was the first to be logged in the early years of white settlement which dates back approximately a century and a quarter. The first sawmill west of the Mississippi River was established here in 1827.

Forest Zone

Early destructive fires, numerous reburns and several decades of logging have significantly influenced practically every portion of the forest zone. Most of the southern three-fifths of the zone is part of the Yacolt

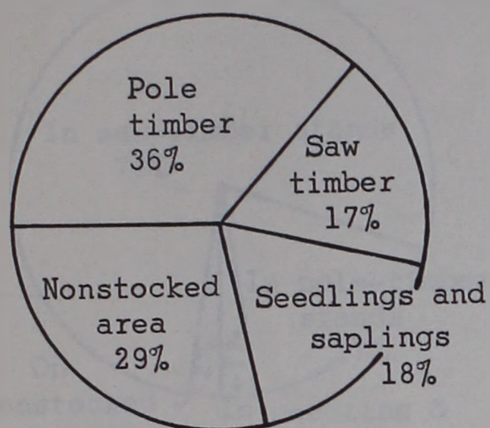


Burn, a huge fire of 1902 which deforested large areas here and in Skamania County to the east. Reburns have kept most of the original burn in a nonstocked condition. Where restocking has occurred it is generally of sparse density. The northern portion of the zone consists of a great number of individual areas of young-growth timber interspersed with a few stands of old growth, recently cut areas, nonstocked cutovers and burns, and small cultivated and pastured tracts. There is a total of about 20,000 acres in agricultural use in this zone.

FOREST LAND

The combined area of forest land in the forest and agricultural zones is 243,000 acres. With the exception of 40 acres of steep rock-cliff formation all of the forest land in the county was classed as commercial forest land, i.e., physically capable of producing usable crops of wood, and not withdrawn from timber utilization.

Stand-Size and Condition Classes

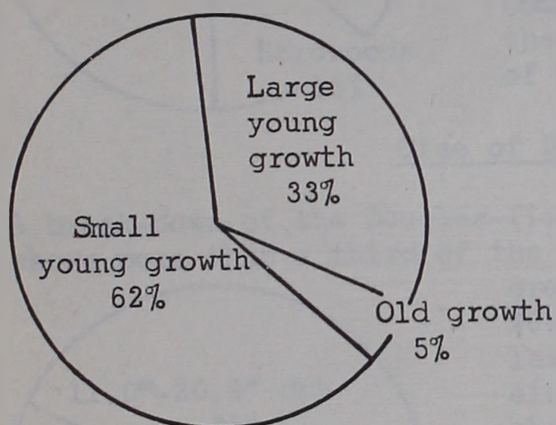


The extent to which the original forest stands of the county have been influenced by fire and cutting is seen in the classification of the forest land by stand-size and condition classes. Total area of saw-timber stands (trees 11 inches and larger d.b.h.) both old growth and young growth is only 42,000 acres. Of the stands less than saw-timber size, pole timber (trees 5 to 11 inches d.b.h.) cover 87,000 acres while seedlings and saplings (trees less than 5 inches d.b.h.) cover

44,000 acres; these young stands are of particular importance in the county's economy as a source of future crops of forest products. On the other hand, some 70,000 acres of nonstocked forest land, chiefly the result of large early fires and reburns, represent a huge waste of forest productive capacity.

Age and Size of Saw-Timber Stands

Only five individual tracts totaling less than 2,000 acres were classed as old-growth timber. In these stands, which range from 180 up to 400 years or more in age, the major portion of the saw-timber volume is in trees more than 41 inches d.b.h. Young-growth, saw-timber stands, ranging in age from about 40 to 180 years,

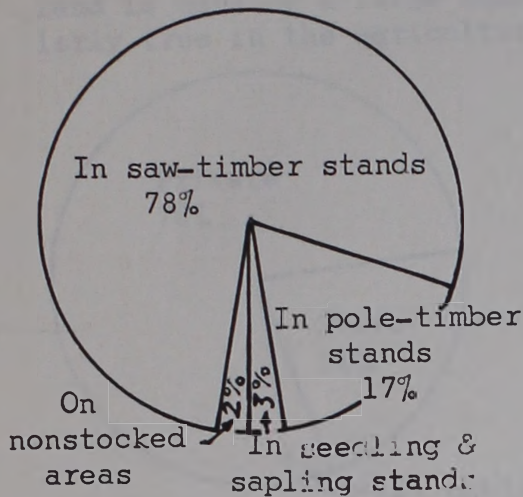


were classed as large if most of the volume was in trees from 21 to 41 inches d.b.h. and as small if the volume was chiefly in trees from 11 to 21 inches d.b.h. Stands classed as large young growth totaled 14,000 acres; those classed as small young growth totaled 26,000 acres.

TIMBER VOLUME

Volume by Stand-Size Class

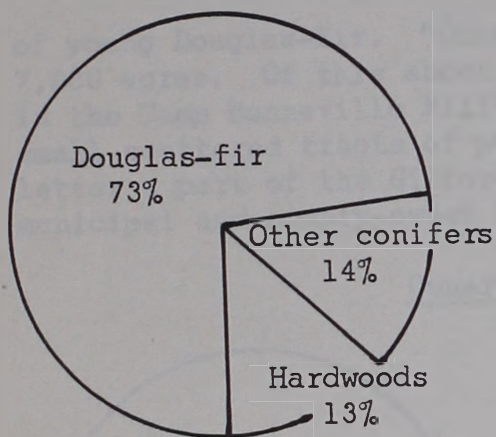
The total net volume of live saw timber, in trees 11 inches d.b.h. and larger, is 1,272,000,000 board feet, log scale, Scribner rule. The portion of this volume that occurs in stands classed as saw timber totals 988,000,000 board feet. The average volume per acre in these



stands is about 23,500 board feet. This small average stand per acre is due to the large portion of the saw-timber area that is small young-growth saw timber. The volume in pole-timber stands, 221,000,000 board feet, and that in seedling and sapling stands, 34,000,000 board feet, is in either scattered old-growth trees or occasional dominant young trees that have reached saw-timber size. A total of 28,000,000 board feet is in scattered trees on areas classed as nonstocked.

Volume by Species

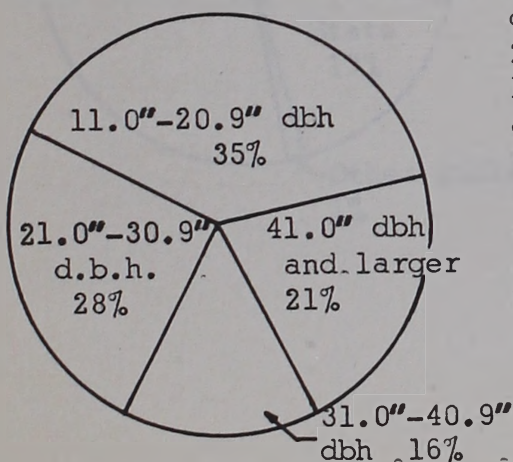
Douglas-fir, the key species in practically all stands throughout the county, has a total volume of 925,000,000 board feet, nearly three-



fourths of the total saw-timber volume. Other conifer species that occur as minority associates of the Douglas-fir have a combined volume of 174,000,000 board feet; these species are western hemlock, western redcedar, and grand fir. The volume in hardwood species totals 173,000,000 board feet; red alder comprises half of this volume; black cottonwood and bigleaf maple comprise about equal shares of the bulk of the remainder; and there is a small amount of Oregon ash.

Size of Douglas-Fir Timber

A break-down of the Douglas-fir saw-timber volume by diameter class shows more than a third of the total, 323,000,000 board feet, is young

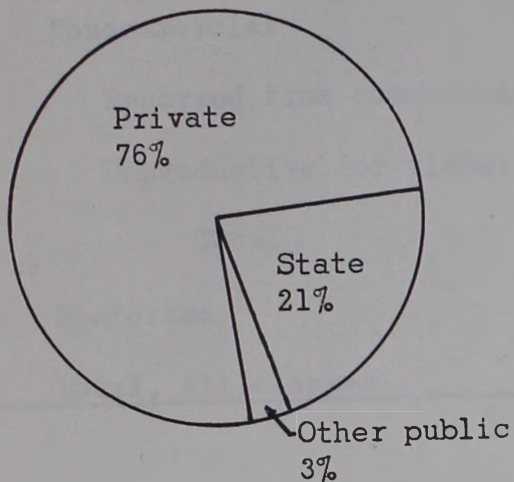


growth from 11 to 21 inches d.b.h. The 260,000,000 board-foot volume in the next larger class, 21 to 31 inches d.b.h. is also young-growth timber. The volume in the third class, 31 to 41 inches, totaling 141,000,000 board feet, is of both young- and old-growth timber, with the bulk of it of young growth. All of the 191,000,000 board feet in the largest class, 41 inches and larger d.b.h., is old growth.

FOREST OWNERSHIP

Ownership of Forest Land

The pattern of forest ownership is chiefly one of small private holdings. Some of the larger timber-holding companies of the State own forest land in the county but their combined acreage is but about a fifth of the total private area. The remainder of the private forest land is held by a large number of individual owners. This is particularly true in the agricultural zone where the "woodlots" range from a few acres to seldom more than 100 acres.

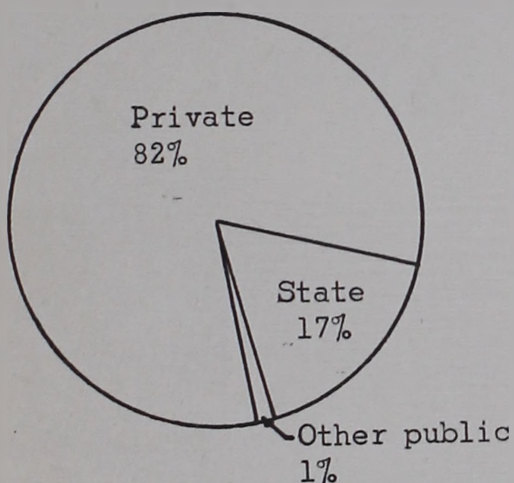


The 185,000 acres of forest land privately held includes 84 percent of the total area of saw timber, 79 percent of the pole-timber and seedling and sapling stands, and 66 percent of the nonstocked area. The forest land owned by the State totals 51,000 acres and is located chiefly in the southeastern portion of the forest zone. The major part of this acreage consists of fairly sizeable tracts of tax-reverted land acquired by the State in recent years from the County; this land is part of the Yacolt Burn and is presently either nonstocked or covered with sparse stands

of young Douglas-fir. "Other public" holdings total slightly under 7,000 acres. Of this about 5,000 acres is in Federal ownership chiefly in the Camp Bonneville Military Reservation; with smaller areas each of small scattered tracts of public-domain and national-forest land, the latter a part of the Gifford Pinchot National Forest. Combined area of municipal and county-owned forest land is about 2,000 acres.

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Ownership of Timber Volume



The ratio of privately owned saw-timber volume to that publicly owned is even greater than in the case of forest land ownership; of the total volume of 1,272,000,000 board feet, 1,042,000,000 board feet is on private land. The State of Washington owns 215,000,000 board feet and other public ownerships have a combined volume of 15,000,000 board feet.

Table 1.--Land area, by major classes of land, 1949

Class of land	Area <u>Acres</u>
Forest:	
Commercial	243,000
Noncommercial	
Reserved from commercial timber use	0
Unproductive for timber use	40
Total	243,040
Nonforest	162,680
Total, all classes	405,720

Table 2.—Commercial forest land area by ownership
and stand-size class, 1949

Ownership class	Total <u>Acres</u>	Saw- timber stands <u>Acres</u>	Pole- timber stands <u>Acres</u>	Seedling and sapling stands <u>Acres</u>	Nonstocked areas <u>Acres</u>
Private	185,310	35,590	71,860	31,540	46,320
State	50,880	6,370	13,070	11,350	20,090
County	190	30	90	20	50
Municipal	1,700		160	400	1,140
Federal:					
National Forest	1,320	80	520	40	680
Public Domain	890	180	430	240	40
Military reser- vation	2,710	10	640	560	1,500
Total Federal	4,920	270	1,590	840	2,220
All ownerships	243,000	42,260	86,770	44,150	69,820

Table 3.--Area of commercial forest land, by major forest type
and stand-size class, 1949

Forest type	Total Acres	Saw-timber stands			Pole timber stands Acres	Seedling and sapling stands Acres	Non- stocked areas Acres
		Old growth Acres	Large young growth Acres	Small young growth Acres			
Douglas-fir	156,270	1,960	13,890	24,980	75,300	40,140	
Western hemlock	2,010			280	1,730		
Hardwoods	14,900			1,150	9,740	4,010	
Nonstocked areas	69,820						69,820
Total	243,000	1,960	13,890	26,410	86,770	44,150	69,820

Table 4.--Area of commercial and noncommercial forest land and nonforest land by ownership class* and cover type, 1949

(Acres)

Survey type symbol	Cover type	Total	Private	State	County	Municipal	Federal		
							Public domain	Military reservation	National forest
All land									
	Forest land	243,040	185,310	50,920	190	1,700	890	2,710	1,320
	Nonforest land	162,680	159,110	2,890	170		80	310	120
	Total	405,720	344,420	53,810	360	1,700	970	3,020	1,440
Commercial forest land									
D5	Douglas-fir large old-growth saw timber (yellow fir)	1,960	1,600	360					
D4	Douglas-fir large young- and old-growth saw timber (red fir)	13,890	10,560	3,180	10		140		
D3	Douglas-fir small young-growth saw timber	24,980	22,060	2,770	20		40	10	80
D2	Douglas-fir pole timber	75,300	61,790	11,720	80	160	390	640	520
D1	Douglas-fir seedlings and saplings	40,140	27,760	11,130	10	400	240	560	40
H3	Western hemlock small saw timber	280	240	40					
H2	Western hemlock pole timber	1,730	1,220	510					
HD3	Hardwood small saw timber	1,150	1,130	20					
HD2	Hardwood pole timber	9,740	8,850	840	10		40		
HD1	Hardwood seedlings and saplings	4,010	3,780	220	10				
X	Recent clear-cut area nonstocked	4,610	4,080	530					
X0	Old clear-cut area nonstocked	18,130	17,260	860	10				
F	Area deforested by fire	47,080	24,980	18,700	40	1,140	40	1,500	680
	Total	243,000	185,310	50,880	190	1,700	890	2,710	1,320
Noncommercial forest land									
NR	Noncommercial rocky	40		40					
Nonforest land									
O	Open--nonvegetative	19,310	18,900	300	20		80	10	
G	Grass and brush	810	440	250					120
A	Agricultural	142,560	139,770	2,340	150			300	
	Total	162,680	159,110	2,890	170		80	310	120

* All unreserved ownership. There is no reserved ownership in this county

Table 5.--Area of commercial forest land by generalized forest type and ownership class,* 1949

(Acres)

Generalized forest type		Total	Private	State	County	Municipal	Federal		
							Public domain	Military reservation	National forest
Conifer saw timber Types D3, D4, D5, and H3	Uncut	40,950	34,340	6,310	30		180	10	80
	Selectively cut	160	120	40					
	Total	41,110	34,460	6,350	30		180	10	80
Conifer pole timber Types D2 and H2	On outcrops	49,570	45,080	4,130	80		60	20	200
	On burns	27,460	17,930	8,100		160	330	620	320
	Total	77,030	63,010	12,230	80	160	390	640	520
Conifer seedlings and saplings Type D1	On outcrops	18,920	17,160	1,710	10		40		40
	On burns	21,220	10,600	9,420		400	200	560	40
	Total	40,140	27,760	11,130	10	400	240	560	40
Recent clear-cut areas, nonstocked Type X		4,610	4,080	530					
Nonstocked clear-cut and burned-over areas Types X0 and F		65,210	42,240	19,560	50	1,140	40	1,500	680
Hardwoods Types HD1, HD2, and HD3		14,900	13,760	1,080	20		40		
Total		243,000	185,310	50,880	190	1,700	890	2,710	1,320

*All unreserved ownership. There is no reserved ownership in this county.

Table 6.—Net volume of live saw timber^{1/} and growing stock^{2/}
on commercial forest land by ownership class, 1949

Ownership class	Saw timber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International 4-inch rule	Million cubic feet
Private	1,042	1,147	312
State	215	237	60
County	1	1)
) 1
Municipal	1	1)
Federally owned or managed:			
National Forest	4	4	1
Public Domain	6	7	2
Military reser- vation	3	3	1
Total Federal	13	14	4
All ownerships	1,272	1,400	377

^{1/} Includes live trees 11.0 inches diameter breast height and larger measured in board feet.

^{2/} Includes live trees 5.0 inches diameter breast height and larger measured in cubic feet.

Table 7.--Net volume of live saw timber and growing stock
on commercial forest land by stand-size class, 1949

Stand-size class	Saw timber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International 4-inch rule	Million cubic feet
Saw-timber stands	988	1,082	218
Pole-timber stands	222	251	139
Seedling and sapling stands	34	37	12
Nonstocked areas	28	30	8
Total	1,272	1,400	377

Table 8.—Net volume of live saw timber and growing stock
on commercial forest land, by species, 1949

Species	Saw timber		Growing stock
	<u>Million board feet,</u> <u>log scale,</u> <u>Scribner rule</u>	<u>Million board feet,</u> <u>International</u> <u>1/4-inch rule</u>	<u>Million</u> <u>cubic feet</u>
Softwoods:			
Douglas-fir	925	1,015	253
Western hemlock	108	117	36
Western redcedar	52	55	18
Grand fir	14	14	3
Total	1,099	1,201	310
Hardwoods:			
Red alder	87	101	42
Bigleaf maple	38	43	17
Black cottonwood	44	51	7
Oregon ash	4	4	1
Total	173	199	67
All species	1,272	1,400	377

Table 9.—Net volume of live Douglas-fir saw timber on commercial forest land by diameter class group and log rule, 1949

Diameter class and log rule	Douglas-fir
	<u>Million board feet</u>
11.0" to 20.9" d.b.h.	
Scribner rule	327
International $\frac{1}{4}$ -inch rule	379
21.0" to 30.9" d.b.h.	
Scribner rule	262
International $\frac{1}{4}$ -inch rule	283
31.0" to 40.9" d.b.h.	
Scribner rule	143
International $\frac{1}{4}$ -inch rule	152
41.0" d.b.h. and larger	
Scribner rule	193
International $\frac{1}{4}$ -inch rule	201
All diameter classes	
Scribner rule	925
International $\frac{1}{4}$ -inch rule	1,015

Table 10.—Net volume of all timber on commercial forest land,
by class of material and species group, 1949

Class of material	Total	Softwoods	Hardwoods
	<u>Million</u> <u>cubic feet</u>	<u>Million</u> <u>cubic feet</u>	<u>Million</u> <u>cubic feet</u>
Growing stock:			
Saw-timber trees:			
Sawlog portion	261	223	38
Upper-stem portion	14	12	2
Total	275	235	40
Pole-timber trees	102	75	27
Total growing stock	377	310	67
Other material:			
Sound cull trees	0	0	0
Rotten cull trees	5	4	1
Salvable dead trees	6	6	0
Total other material	11	10	1
Total, all timber	388	320	68

Table 11.--Average annual commodity drain on live saw timber and growing stock on commercial forest land, by species group, for the period 1948-1951 incl.

Species group	Saw timber						Growing stock		
	Timber products	Logging residual	Commodity drain ^{1/}	Timber products	Logging residual	Commodity drain ^{1/}	Timber products	Logging residual	Commodity drain ^{1/}
	Thousand board feet log scale, Scribner rule			Thousand board feet, International $\frac{1}{4}$ -inch rule			Thousand cubic feet		
Softwoods	35,087	5,017	40,104	38,361	5,485	43,846	7,974	1,140	9,114
Hardwoods	5,523	790	6,313	6,349	908	7,257	1,255	180	1,435
Total	40,610	5,807	46,417	44,710	6,393	51,103	9,229	1,320	10,549

^{1/} Total of timber-products output and logging residual. Timber-products output is the portion of the inventory volume removed from the woods; logging residual is the portion cut or killed in logging not removed from the woods.

FOREST SURVEY PROCEDURE

The procedures used in the second Forest Survey reinventory of Clark County were materially different from the procedures used in the initial inventory and first reinventory. This change in procedures accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of each of the procedures seems desirable.

Initial Inventory

In the initial inventory in 1931 the eastern half of the county, very largely forest land and classed as a forest zone, was covered by what was known as the "compilation method." The western half, consisting chiefly of agricultural land interspersed with scattered fragments of forest land and classed as the agricultural zone, was covered by a linear survey.

In the compilation method existing information on forest types, timber cruises, and other pertinent data was collected from private timber owners and various public agencies. These data were checked in the field for reliability, and were then adjusted to the specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by existing information were obtained through field reconnaissance. All forest land in the zone was classified by type, stand-size class, and in case of young-growth stands by stocking and age classes. All such classes were mapped in place on a county type map, scale 1 inch equals 1 mile. In-place, timber-volume estimates were based on the existing cruise data collected from private and public sources, on field cruises, and on ocular estimates. Volume of young-growth saw timber was computed by applying yield-table values, adjusted for age of stand, stocking density, and site, to type acreages.

In the linear survey of the agricultural zone forest-type and timber-volume data were taken on line transects extending across the zone at intervals of 3 chains. Such data, computed on a per-acre basis, were applied to the total acreage of the zone.

First Reinventory

The first reinventory of the forest zone in 1939 included a complete revision of the in-place forest type map. For this revision, records of cutting and other forms of drain, since the initial inventory, were obtained from various sources and verified in the field by ground reconnaissance. Areas on which the type had changed due to cutting, restocking of cut-over or burned-over land, and ingrowth of immature stands were remapped on the ground. The ownership status

was brought up to date. On the basis of the new ownership data and the revised forest type map, area statistics by forest types were recomputed. Timber volume estimates for old-growth, saw-timber stands were based on cruise data collected during the initial inventory, adjusted for cutting and other drain. Volume estimates for immature stands were determined from yield tables adjusted for site quality, age, and density of stand.

In the agricultural zone the line transects were rerun to determine changes in forest type areas and timber volumes during the interval between inventories. On basis of these changes revised statistics were developed for the zone.

Second Reinventory

In the reinventory in 1949 a different procedure each was used in the forest zone and agricultural zone. In the forest zone complete revision of the forest type map was obtained through interpretation, classification and mapping on aerial photos that covered all of the forest land. In the mapping on aerial photos, types of doubtful classification were checked in the field as was the species composition of stands. This use of photos in mapping resulted in type delineations of much greater accuracy and detail than were possible through the ground reconnaissance employed in the initial inventory. In the preparation of a revised type map, the delineations on the aerial photos were transferred to a 1-inch county base map through use of a photo projector. The new type map was then superimposed over a current ownership-status map of complete county coverage and a dot count made of forest type areas by ownership class.

Volume estimates each of live saw timber, growing stock, and salvable dead material in the forest zone were calculated by applying average-per-acre volumes to the appropriate forest type acreages. The per-acre volumes for saw-timber and pole-timber stands were obtained through a sampling procedure in which the stands were measured on randomly selected plots. Intensity of the sampling was so designed as to produce a total estimate of volume in the county of a specified sampling accuracy set by Forest Survey. In the random selection of samples each individual saw-timber or pole-timber stand in the county had an equal chance of being selected. A sample consisted of a cluster of three one-fifth-acre circular plots spaced at regular 6-chain intervals. A total of 13 plot clusters, or 39 one-fifth-acre plots, was taken in saw-timber and pole-timber stands. Average-per-acre volumes of scattered saw-timber and pole-timber trees in seedling and sapling stands and on nonstocked areas were obtained through an aerial-photo-plot sampling procedure. A total of 1185 one-acre photo plots was taken in a modified systematic-random pattern. By photo interpretation, estimates were made of average number of trees per acre of both saw-timber and pole-timber size, average crown diameter, and total tree height.

Gross volume of the average tree, obtained from photo-volume tables, was adjusted upon basis of an empirical estimate of defect in order to obtain net volume.

In the agricultural zone a triple-sampling scheme was employed. A total of 1885 mechanically spaced plots were stereoscopically examined on aerial photographs and classified as to land use. In the case of forest land the species type and size class were estimated. From this group of plots 62 were randomly selected, visited in the field and assigned their correct land use, species, and size class. These plots formed the basis for correcting the photo plots in order to determine the total areas of the various classes. From these 62 plots 13 were randomly selected as volume samples. At these plots volumes were measured on two 1/5-acre plots 3 chains apart. These plots formed the basis for the volume estimates.

SAMPLING ACCURACY

Forest Area

In the reinventory, in-place mapping of the forest lands in the forest zone and their classification by forest type, stand-size class, or condition class were on the basis of 100-percent coverage. Therefore, no sampling error was involved. Errors due to techniques or judgment were possible but difficult to evaluate.

Timber Volume

For the timber volume, derived from sampling surveys, the chances are two out of three that the estimated total saw-timber volume in the forest and agricultural zones combined does not vary in either direction from the true volume more than 15.5 percent; the estimated total growing-stock volume does not vary more than 14.4 percent.

COMPARISON OF INVENTORIES

Due to considerable differences in Forest Survey specifications, standards of utilization, and procedures, a direct comparison of most of the statistics from the reinventory in 1949 with those from the initial inventory in 1931 (adjusted to 1933) and first reinventory of 1943 is not possible. Some of the forest-area statistics can be compared after slight adjustment for differences in specifications.

Forest Land

The forest-land areas, classified by stand-size and condition classes, resulting from the three inventories are shown in the table below on a comparable basis as far as specifications are concerned.

Each of the saw-timber acreages include stands 11.0 inches d.b.h. and larger.

Changes in Forest Land by Stand-Size and
Condition Classes Between Inventories

Inventory	Total forest land	Commercial forest land (Unreserved and reserved)					Noncommercial forest land
		Total	Saw timber	Pole timber	Seedlings and saplings	Nonstocked areas	
		<u>Thousands of acres</u>					
1933	227	227	38	37	42	110	*
1943	241	241	46	38	89	68	*
1949	243	243	42	87	44	70	*

* Less than 500 acres.

The material increase in total area of forest land between 1933 and 1943 and the smaller increase between 1943 and 1949 was due in part to farm abandonment on some of the foothills of the forest zone and partly to a difference in classification of cut-over lands--classed as stump pastures and therefore in agricultural use in 1933, but classed as forest land in 1943 and 1949.

The increase in area of saw-timber stands, even in the face of considerable logging activity, is the result of ingrowth of stands from the pole-timber class. In the stands under saw-timber size the most significant change is the large acreage of seedling and sapling stands that moved up to the pole class during the period 1943-49.

There was only a slight increase in area of nonstocked land between 1943 and 1949; the acreage of such land that became restocked during the interval was more than offset by the acreage of recent clear-cut areas that had not had sufficient time to restock.

Timber Volume

Direct comparison of the total volume of saw timber in 1949 with that in 1933 or 1943 is not possible. One reason is that the minimum diameter specification for saw timber which was 15 inches in the 1933 and 1943 inventories was lowered to 11 inches in 1949. A second reason is that during the 16-year interval there had been much intensification of timber utilization on logging operations; in recent years more and more of the gross stand volume is being removed from the woods as timber products. In the 1949 inventory this increase in intensity of utilization was accounted for by using volume tables that gave considerably greater values for a tree of given size than did the tables used in the

two earlier inventories. And another reason is the inclusion in 1949 of the volume in scattered trees in the overstory of pole, seedling and sapling stands and including a small volume on cut-over and burned-over lands classed as nonstocked. This volume totaled 284 million board feet; volume of similar trees was not included in the 1933 and 1943 inventories because at those times it was not considered utilizable.

However, it is possible to make a comparison of the 1933 and 1943 saw-timber volumes with the 1949 saw-timber volume after the volume of trees between 11.0 inches and 15.0 inches d.b.h., totaling 110 million board feet, and the overstory volume of 284 million board feet in pole, seedling and sapling stands have been excluded. Such a comparison is made in the following tabulation:

Changes in Timber Volume Between Inventories

Inventory	Volume on commercial forest land (unreserved and reserved) of--	
	Saw timber	Growing stock
	<u>Million board feet, log scale, Scribner rule</u>	<u>Million cubic feet</u>
1933	695	402
1943	641	371
1949	878	377

The increase of 183 million board feet in saw-timber volume between 1933 and 1949 is due in part to the difference in volume tables used, but the major portion is due to an excess of the volume of growth over the volume of cutting drain in this county during the 16-year period. As stated in "Significant Findings in the Forest Inventory," page 2, 95 percent of the saw-timber acreage is stocked with young-growth stands many of which are at an age of high growth rate.

Comparison of the cubic-foot volumes of growing stock, which includes both saw-timber and pole-timber trees, is more direct because of only slight differences in specifications and standards of utilization between inventories. This volume in 1949 was about 6 percent less than in 1933.

DEFINITION OF TERMS USED

Land Area

Total Land

Includes dry land and unmeandered water surface.

Forest Land

Includes (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10 percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the county was 40 acres.

Nonforest Land

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county was 40 acres.

Forest Land Classes

Commercial Forest Land

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Noncommercial Forest Land

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land and (b) incapable of yielding usable wood products (usually saw timber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Reserved from Commercial Timber Use

Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive for Timber Use

Forest land incapable of yielding usable wood products (usually saw timber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Forest Types

Forest Type

A forest stand characterized by the predominance of certain key species--in terms of cubic volume for saw-timber and pole-timber stands, and in number of trees for seedling and sapling stands--or a forest condition such as nonstocked cut-over or burned-over land. The generalized forest types listed in table 3 are of the following composition:

Douglas-fir. Stands comprised of 50 percent or more of Douglas-fir by cubic volume or number of trees.

Western hemlock. Stands comprised of 50 percent or more of western hemlock by cubic volume or number of trees.

Hardwoods. Stands comprised of 50 percent or more of one of the merchantable hardwood species.

Nonstocked area. Cut-over or burned-over area on which the restocking, if any, is less than 10 percent density and which does not support a residual stand meeting minimum saw-timber requirements.

Tree Classes

Saw-Timber Tree

Softwood or hardwood tree 11.0 inches d.b.h. or larger containing at least one 16-foot log to a variable top diameter inside bark approximating 40 percent of diameter breast height, but never less than 8 inches, and in which 25 percent or more of the gross board-foot volume is free from rot and defect.

Pole-Timber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Cull Tree

Live tree of saw-timber or pole-timber size that is unmerchantable (now or prospectively) because of defect or rot.

Rotten cull tree. Live tree of saw-timber or pole-timber size in which less than 25 percent of the total volume is sound.

Sound cull tree. Live tree of saw-timber or pole-timber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness or poor form.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable log.

Stand-Size Classes

Saw-Timber Stand

Stand of saw-timber trees having a minimum net volume per acre as follows: 5,000 board feet, log scale, Scribner rule, in any conifer species; 1,000 board feet in hardwoods.

Old-growth saw-timber stand. Stand in which the majority of the volume is in trees more than about 180 years of age and larger than 21.0 inches d.b.h.

Large old-growth saw-timber stand. Stand in which the majority of the volume is in trees more than 41.0 inches d.b.h.

Small old-growth saw-timber stand. Stand in which the majority of the volume is in trees from 21.0 inches to 40.9 inches d.b.h.

Large young-growth saw timber stand. Stand in which the majority of the volume is in trees under about 180 years of age and from 21.0 inches to 40.9 inches d.b.h.

Small young-growth saw-timber stand. Stand in which the majority of the volume is in trees under 180 years of age and from 11.0 to 20.9 inches d.b.h.

Pole-Timber Stand

Stand failing to meet saw-timber-stand specifications but of at least 10-percent stocking of trees 5.0 inches d.b.h. and larger, with at least one-half the minimum stocking in pole-timber trees (5.0 inches to 10.9 inches d.b.h.).

Seedling and Sapling Stand

Stand not qualifying as either saw-timber or pole-timber stand but having at least 10 percent stocking of trees and with at least one-half the minimum stocking in seedlings and saplings (0 inch to 4.9 inches d.b.h.).

Timber Volume

Saw-Timber Volume

Net volume in board feet of live and salvable dead saw-timber trees to a merchantable top.

Scribner rule. The common board-foot rule used in determining log-scale volume of saw timber in this region. This rule underestimates, particularly in case of timber of the smaller diameters, the volume of lumber that could be produced from the timber.

International $\frac{1}{4}$ -inch rule. The standard board-foot rule adopted by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live saw-timber trees and live pole-timber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

Commercial Tree Species

Tree species considered in determining stocking and growing stock. Includes species presently or prospectively usable for commercial timber products.

Commercial tree species in Clark County include:

Softwoods:

Douglas-fir (Pseudotsuga taxifolia)
Western hemlock (Tsuga heterophylla)
Western redcedar (Thuja plicata)
Grand fir (Abies grandis)

Hardwoods:

Red alder (Alnus rubra)
Bigleaf maple (Acer macrophyllum)
Black cottonwood (Populus trichocarpa)
Oregon ash (Fraxinus oregona)

Commodity Drain

Commodity Drain on Live Saw Timber

Board-foot volume of live saw-timber trees removed from commercial forest land during a specified year as timber products

and that left as logging residue.

Timber products output. The live saw-timber volume entering into timber products during a specified year.

Logging residue. The live saw-timber volume that is cut or killed in logging during a specified year but is not removed from the forest as timber products.

Commodity Drain on Growing Stock

The cubic-foot volume of live saw-timber and pole-timber trees removed from commercial forest land during a specified year as timber products and left as logging residue.

Timber products output. The growing-stock volume entering into timber products during a specified year.

Logging residue. The growing stock volume that is cut or killed in logging during a specified year but is not removed as timber products.